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NOTES ON HIPPOBOSCIDAE.

5. The American species of Lipoptena.

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In the course of a revision of the subfamily Melophaginae, now in progress, several hundred specimens of *Lipoptena*, from North and South America, have been studied. The material was obtained from many different sources, which for want of space cannot be acknowledged by name. I am, however, under particular obligation to Professor G. F. Ferris, who very generously forwarded to me for study his entire collection of Melophaginae.

In the American material seen thus far, I am able to distinguish, on structural characters, no more than four species, two of which appear to be very closely related. The following key may help in separating them.

1. Integument of head and dorsum of thorax granular, owing to thickened bases of the numerous setae. Frontal bristles and hairs many (12 to 15 or more on each side), extending to behind the eyes. Apex of scutellum usually with 4 (rarely with 3, 5 or 6) setae of about equal length. A row of short, very stout, notopleural setae before the base of the wing. Apical seta of fore tibia strong. Fore coxa with a dorsal, retrograde spur. Claws distinctly asymmetrical. Abdomen (in both sexes) basally with a single sclerotized tergite, divided into two plates by a narrow median notch. Basal sternite evenly rounded posteriorly. Costa of wing ending far from the tip in a broad, stigma-like thickening *L. ferrisi* J. Bequaert.
- Head and thorax with few, spaced setae. Usually one to three (rarely more) frontal bristles and hairs, none of them behind the eyes. Fore coxa without dorsal, retrograde

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- spur (at most slightly angular behind). Sclerotized plates of abdomen different 2.
2. Scutellum with an apical row of 6 to 8 setae, of which the median pair are much the longest. Mesonotum with a fine median impressed line, on either side of which there is a conspicuous curved row of setae followed by a slightly curved longitudinal depression. Two rows of notopleural setae before the base of the wing, the posterior ones very long. Apical seta of fore tibia stout. Claws unusually slender, slightly asymmetrical. Abdomen with many sclerotized plates dorsally: a short basal plate, divided by a broad median notch; two long, lateral plates on each side leaving a broad median space partly covered by four plates, the first of which is reniform, the others transverse. Basal sternite deeply bifid. Costa of wing ending rather close to the tip, without conspicuous thickening *L. cervi* (Linnaeus).
- Scutellum with a single apical pair of setae (very rarely more; sometimes only one seta). Median setae of mesonotum not placed in two conspicuous longitudinal, curved rows. Claws robust. Sclerotized plates of abdomen different. 3.
3. Mesonotum with many setae, those of the median portion forming a transverse group (in more than one row) on either side of the median impressed line. Two rows of notopleural setae before the base of the wing, the posterior ones very long. Abdomen dorsally (in female) with a short basal plate divided by a narrow median notch; one very long, triangular, lateral plate on each side; and two small, transverse, median plates before the anus; middle of the dorsal face without differentiated plates. Basal sternite deeply bilobed. Apical seta of fore tibia very weak, hair-like. Claws distinctly asymmetrical. Costa of wing ending far from the tip in a broad, stigma-like thickening *L. depressa* (Say).
- Mesonotum with few setae, those of the median portion forming a single transverse row of three or four, in line with the single row of notopleural setae before the base of the wing. Sclerotized plates of abdomen much as in *L. depressa*. Apical seta of fore tibia stout. Claws nearly symmetrical. (Wing unknown) . . . *L. mazamae* Rondani.

Lipoptena ferrisi J. Bequaert.

Lipoptena ferrisi J. Bequaert, 1935, Bull. Brooklyn Ent. Soc.,

XXX, p. 170 (new name for *L. subulata* Ferris and Cole, 1922).

Lipoptena subulata Ferris and Cole, 1922, Parasitology, XIV, p. 187, figs. 2C and 4 (♂ ♀; off *Odocoileus columbianus*, in Humboldt and Mendocino Counties; also taken in flight on Mt. Wilson; all in California). Not of Coquillett, 1907.

As I stated in a preliminary notice, the common Deer parasite of the Pacific Coast and western Rocky Mountains was erroneously believed by Ferris and Cole to be *L. subulata*. A study of Coquillett's types and of additional material from the eastern United States, shows that *subulata* is a different insect, discussed below under *L. cervi*.

It is not necessary to redescribe *ferrisi* at this time, since it was sufficiently characterized and well illustrated by Ferris and Cole. My key, moreover, shows the characters of diagnostic value. *L. ferrisi* is not closely related to the other American species.

SPECIMENS EXAMINED:—Holotype (female) and allotype (male), off *Odocoileus columbianus*, Mendocino Co., CALIFORNIA (G. F. Ferris Collection).

Numerous paratypes of both sexes, winged and deãlated, from the following localities. BRITISH COLUMBIA: Victoria (Can. Natl. Coll.); Savary Island (Can. Natl. Coll.); Kamloops, off *Odocoileus hemionus hemionus* (G. J. Spencer and J. Keyes).—CALIFORNIA: Mt. Lowe, Los Angeles Co. (J. M. Aldrich); Toro Peak, Sta. Rosa Mts., 8,000 ft., Riverside Co., off Mule Deer, *Odocoileus hemionus californicus* (F. Grinnell, Jr.); San Gabriel Mts., Switzers Camp, Los Angeles Co. (F. Grinnell, Jr.); Humboldt Co., off *Odocoileus columbianus* (in G. F. Ferris Coll.); Tulare Co. (in G. F. Ferris Coll.); Madera Co., off Western White-tailed Deer (Henry Dietrich); San Jacinto Mts., Riverside Co. (R. H. Beamer); Strawberry, Tuolumne Co. (R. H. Beamer); Lemon Cove, Tulare Co. (Paul W. Oman); Tehama Co., supposedly off California Valley Quail, *Lophortyx californica* (L. V. Compton); Beckwith, Plumas Co., off Mule Deer (L. W. Swift); Westwood, Lassen Co., off Western Black-tailed Deer; Mt. Pinos, Sta. Barbara Co. (C. S. Robinson); Sulphur Springs, Lake Co. (L. S. Neville); Minnelusa, San Bernardino Co. (H. O. Robe); San Bernardino, San Bernardino Co. (D. S. Spears); Fresno Co., off Western Black-tailed Deer (M. F. Canova); Logan Creek, Riverside Co., or San Bernardino Co. (M. F. Canova); Carson Creek, Marin Co. (J. W. Maillard); Yosemite Valley, Mariposa Co.

(E. C. Van Dyke).—OREGON: Cascadia, Linn Co. (W. W. Baker); Adel, Lake Co., off Mule Deer (Alex. Walker); Riddle, Douglas Co., off Deer (C. M. Gjullin); Tiller, Douglas Co. (L. S. Stevens); Enterprise, Wallawa Co., off Mule Deer (H. H. Stage); Dayville, Grant Co. (H. Carr); Big Valley, Lake Co., off Mule Deer (H. H. Stage); Keno, Klamath Co., off *Odocoileus columbianus* (H. H. Stage); Malheur National Forest, Harney Co., off Mule Deer (H. H. Stage).—MONTANA: Ravalli Co., off Black-tailed Deer (sent by C. B. Philip); Lincoln Co. (sent by C. B. Philip); Sanders Co., bred from pupae off Western White-tailed Deer (W. L. Jellison).—Paratypes in the C. F. Ferris Collection, the Canadian National Collection (Ottawa), Kansas University (Dept. Ent.), the Rocky Mountain Spotted Fever Laboratory (Hamilton, Mont.), the United States Bureau of Entomology, Cornell University (Dept. Ent.), the United States National Museum, the American Museum of Natural History, the Museum of Comparative Zoölogy (Cambridge, Mass.), the California Academy of Sciences, the University of British Columbia and the Wm. W. Baker Collection.

L. ferrisi is probably distributed over the entire Pacific Coast and western Rocky Mountain area, where it appears to be a common parasite of the Western Black-tailed Deer, *Odocoileus columbianus* (Richardson), the Mule Deer, *Odocoileus hemionus* (Rafinesque), and the Western White-tailed Deer, *Odocoileus virginianus leucurus* (Douglas). Mr. H. S. Peters, of the U. S. Bureau of Biological Survey, sent me one winged male supposedly taken (but not by him) from California Valley Quail, *Lophortyx californica* (Shaw); but, as I explain under *L. cervi* and *L. depressa*, it may be doubted whether the fly was more than an accidental guest in the plumage of the bird and whether it was actually feeding on the blood of this host.

Lipoptena cervi (Linnaeus).

Pediculus cervi Linnaeus, 1758, Syst. Nat., 10th Ed., I, p. 611 (no sex; no locality; from Europe; "in *Cervo elapho, dama, capreolo*"); 1761, Fauna Suecica, 2d Ed., p. 476 here recorded from Sweden, which may be taken as the type locality).

Hippobosca (*Lipoptena*) *cervina* Nitzsch, 1818, Germar's Mag. d. Entom., III, p. 311 (emendation of *cervi* Linnaeus).

Pediculus capreoli "Frisch" Nitzsch, 1818, Germar's Mag. d. Entom., III, p. 311 (as a synonym of *H. cervina*).

- [Frisch, 1736, Beschr. All. Insekt. in Teutschland, XII, p. 15, Pl. V; pre-Linnaean.]
- Haemobora pallipes* Curtis, 1824, British Entomology, VIII, Pl. XIV (♂; off man; New Forest, England).
- Ornithobia pallida* Meigen, 1830, Syst. Beschr. Europ. Zweifl. Ins., VI, p. 230, Pl. LXIII, figs. 21-24 (no sex; no host; Europe).
- Ornithomyia nigrirostris* v. Roser, 1840, Correspondenzbl. Landwirtsch. Ver. Württemberg, I, p. 64 [original of this reference not seen].
- Lipoptena alcis* Schnabl, 1881, Phys. Denkschr. Warschau, p. 34 (♀; off Elk, *Alces alces*; region of Pinsk, Lithuania) [original of this reference not seen].
- Lipoptena subulata* Coquillett, 1907, Ent. News, XVIII, p. 290 (♀ ♂; off Deer; Woodstock, New Hampshire).
- Lipoptena cervi* var. *obscura* "Rörig" Lühe, 1906, Schrift. Phys. Oekon. Ges. Königsberg, XLVI (1905), p. 180 (as a synonym of *L. cervi* var. *alcis*).

SPECIMENS EXAMINED.—ENGLAND: Nottingham, Wollaton Park, off Red Deer (H. P. Jones); Great Park, Windsor, Berks. (G. Salt).—SCOTLAND: Perthshire, 2,000 ft., off Red Deer (R. Meinertzhagen); Balmacaan, Glen Urquhart, Inverness, off Red Deer (received from E. E. Austen).—DENMARK: Horseus, Jutland; Lindum, Jutland; Ruderhegn and Dyrehaven near Copenhagen.—ESTHONIA: Reval, off *Alces alces*.—BELGIUM: Mirwart (J. Ghesquière).—FRANCE: Parcé, Dept. Sarthe (G. Abot); Reccy-sur-Ource, Dept. Côte d'Or, off *Capreolus capreolus* (J. P. Chapin); Fougère, Dept. Maine-et-Loire, off Roe.—GERMANY: Rossitten, Kurischer Nehrung, off *Alces alces*; East Prussia, off *Alces alces* (received from A. Bau, in G. F. Ferris Collection); Hunsrück, Rheinland, off *Capreolus capreolus* (C. Hilgert).—AUSTRIA: Villach, Carniolia (Dr. Troll); Kaltenlust Geb., Lower Austria (Ruschka); Aggsbach, Lower Austria (H. Zerny); Hainfeld, Lower Austria (J. Mik); Mödling (A. Handlirsch); Stein am Danau; Manhartsberg, Lower Austria (H. Zerny); Nasswald, Lower Austria (H. Zerny); Forchtenau, Burgenland (H. Zerny).—HUNGARY: (H. Zerny).—ALBANIA: Ungrej (H. H. Karny).—SIBERIA: Baikal University Station (T. D. A. Cockerell); Amur Region (Schrenk).—NEW HAMPSHIRE: Woodstock, Grafton Co., off Deer (J. T. Long; holotype and paratypes of *L. subulata* at U. S. Nat. Mus.); Corbin Park, near Newport, Sullivan Co., off *Odocoileus virginianus borealis* (J. D. Smith; T. Barbour and W.

S. Brooks).—MASSACHUSETTS: Naushon Island, Dukes Co., winged and deãlated specimens, off Northern White-tailed Deer, *Odocoileus virginianus borealis*, and winged specimens flying, October 25, 1924 (J. Bequaert).—PENNSYLVANIA: Pike Co., off Virginia White-tailed Deer (H. S. Peters); Clinton Co., off Virginia White-tailed Deer (T. E. Winecoff).

The Deer ked, *Lipoptena cervi*, is found over most of the Palearctic Region. There are definite and reliable published records from England, Scotland, the Netherlands, Belgium, France, southern Scandinavia, Denmark, Germany, Esthonia, Curland (Latvia), Lithuania, Poland, Austria, Carniolia, Hungary, Dalmatia, Tcheko-Slovakia, Bulgaria, Albania, Spain, Algeria, and Siberia.

Walker's (1849) records from Northern Bengal and Egypt, and C. Dover's (1921) from Barkuda Island (Chilka Lake, India; off Chital) were probably erroneous. The specimens recorded by C. W. Howard (1912) from Portuguese East Africa, as *L. cervi*, were a species of *Echestypus* (I have seen them at the U. S. National Museum). I am also inclined to doubt the authenticity of Austen's (1903 and 1906) record of *L. cervi* from Modderfontein Factory (14 miles south of Johannesburg, Transvaal); at any rate, the species has not been taken in South Africa in recent years.

The normal hosts of *L. cervi* are the several common Deer of the Palearctic Region, viz., the Roe, *Capreolus capreolus* (Linnaeus) (= *caprea* Linnaeus); the Red Deer, *Cervus elaphus* Linnaeus; and the Fallow Deer, *Dama dama* (Linnaeus); as well as the European Elk, *Alces alces* (Linnaeus).¹ On these normal hosts the parasites are often numerous, sometimes three or four dozen being found on a single Deer. *L. cervi* has been taken accidentally on various other mammals. Massonat (1909) reports a deãlated female off a Badger, *Meles taxus*, at Les Dombes (Dept. Ain, France); Brumpt (1922) and L. Falcoz (1926) list among the hosts in nature the European Boar, *Sus scrofa*; and Kohn (1924) reports finding a deãlated male on a cow. That the winged stages also stray onto horses (Mégnin, 1899) and people is well known. G. Schroeder (1911) tells how he caught on an October day, in Pomerania, over a hundred flies that settled on people who were crossing a clearing in a forest frequented by Deer. H. Scholtz (1848), Villeneuve (1913), and Brumpt (1922) observed this species biting man either in nature or in captivity. Brumpt also

¹ Various authors include the North European reindeer, *Rangifer tarandus* (Linnaeus), among the hosts of *L. cervi*; but I have been unable to trace an authenticated instance of the fly having been taken from this host.

fed the flies in captivity on monkey, dog, mule, horse, chicken and pigeon.

In the few localities of the northeastern United States where *L. cervi* has become naturalized, it is often abundant on Virginia White-tailed Deer, *Odocoileus virginianus borealis* Miller.

There is a widespread belief, often repeated in general accounts and text-books, that the winged individuals of *L. cervi* live on birds (especially gallinaceous birds) in the spring and migrate to Deer in the fall, after which they lose the wings. I can find, however, no evidence that *L. cervi* is normally winged on birds and wingless on mammalian hosts. The error probably originated with Meigen's description of the winged individuals as a distinct species, although he stated clearly enough that the host of his *Ornithobia pallida* was unknown, adding "vermuthlich ist er auf Vögeln." Newly hatched, winged flies may, of course, sometimes stray onto birds. Yet I have found no strictly reliable records of bird hosts. Leunis (1886) and Klugkist (1909) mention the Grouse (Haselluhn; *Bonasa*) as one of the hosts; and Schuurmans-Stekhoven (1928) lists *L. cervi* from "Finken: *Passer domesticus*, *Fringilla* sp." But it is not clearly stated that these authors themselves took any of the flies off the birds. Where Deer are common, winged *Lipoptena* are frequently abundant in the fall, often flying onto man, and when this happens with a hunter, while he picks up a freshly shot bird, it might readily lead to the belief that the flies came off the bird. There are, moreover, definite observations of winged, as well as wingless, individuals occurring in large numbers on Deer in the autumn.

That *Haemobora pallipes* Curtis and *Ornithobia pallida* Meigen were based upon winged males of *L. cervi* is now generally accepted (see C. v. Siebold, 1845 and 1850; H. Schaum, 1849; H. Loew, 1849, quoted by Schaum; J. Schiner, 1853; etc.) and needs no further discussion. The synonymy of *Ornithomyia nigrirostris* v. Roser was established by Speiser (1905) through a study of the types, which are males of *L. cervi* (not *Ornithomyia avicularia*, as Bezzi had surmised).

After carefully comparing several females and males of so-called *L. alcis* from European Elk, with *L. cervi* off European Deer from England and France, where Elk is not known to occur, I am unable to discover any difference whatsoever either in structure or in the arrangement of the setae. Schnabl claimed that the form found on Elk was larger and darker than the usual parasite of Deer; but I have seen specimens taken on Deer that do not appreciably differ in these respects from those off Elk. C. T. v. Siebold (1850) and

J. Mik (1882) reached similar conclusions. I do not believe that *alcis* can be retained even as a variety. In my opinion the Elk is merely one of several normal hosts of *L. cervi*, and where both Deer and Elk occur the fly moves freely from one to the other. *L. cervi* var. *obscura* is a superfluous synonym of *alcis*.

When Coquillett described his *L. subulata*, he compared it with *L. depressa*, but not with the European *L. cervi*. His description is based mainly upon color, the only structural character of importance mentioned being the stout seta at the apex of the fore tibia. Ferris and Cole (1922) believed that Coquillett's species was the common Western parasite of Deer which I have called *L. ferrisi*. A careful study of Coquillett's types, as well as of numerous specimens from other localities in the eastern United States, shows conclusively that *L. subulata* is not separable from *L. cervi*. It is, moreover, my belief that the occurrence of this species in North America is merely due to recent and accidental introduction by man. In the limited area where it has been taken, Deer have often been introduced from Europe during the nineteenth century. From these introduced animals the keds passed onto the native Virginia White-tailed Deer, on which host they are now perfectly acclimatized in certain localities.

Lipoptena depressa (Say).

Melophagus depressus Say, 1823, Jl. Acad. Nat. Sci. Philadelphia, III, p. 104 (no sex; off "*Cervus virginianus*"; North America, without definite locality, but probably from somewhere in Colorado).

Lipoptena depressa Ferris and Cole, 1922, Parasitology, XIV, p. 182, figs. 1, 2B, 2D, and 2F (♀ ♂).

SPECIMENS EXAMINED.—BRITISH COLUMBIA: Cranbrook, off Columbia White-tailed Deer; Vancouver Island (Victoria; Comox; Englishman's River; and north end), off Columbia White-tailed Deer (G. J. Spencer); Howe Sound, on the mainland, off Columbia White-tailed Deer (G. J. Spencer); Lasqueti Island, off Columbia White-tailed Deer (G. J. Spencer); Deer Park (G. F. Ferris); Little Canbon (K. Racey).—WASHINGTON STATE: Orcas Island, San Juan Co., off Western Black-tailed Deer (C. B. Philip); Carson, Skamania Co., off *Odocoileus columbianus* (H. H. Stage).—OREGON: Malheur National Forest, Harney Co., off Mule Deer (H. H. Stage); Dayville, Grant Co. (H. Carr); Kimberly, Grant Co., off Mule Deer (C. V. Bales); Cascadia, Linn Co. (W. W. Baker); Riddle, Douglas Co., off Deer (C. M.

Gjullin); Alsea, Benton Co., off Western Black-tailed Deer (H. H. Stage); Florence, Lane Co., off Western Black-tailed Deer (H. H. Stage); Blaine, off Western Black-tailed Deer (H. H. Stage); Paisley, Lake Co., off Mule Deer (H. H. Stage); Lincoln Co., off *Odocoileus hemionus* (H. H. Stage); Harney Co., off *Odocoileus hemionus* (H. H. Stage).—MONTANA: Trout Creek Sanders Co. (Ed. Button); Lo-Lo, Missoula Co., off Western Black-tailed Deer (W. V. King); Ravalli Co. and West Fork, Ravalli Co., off Western Black-tailed Deer (C. B. Philip).—CALIFORNIA: Los Angeles Co. (M. F. Canova); Logan Creek, Riverside Co. or San Bernardino Co. (M. F. Canova); 18 miles East of Mokelumne Hill, Calaveras Co. (M. F. Canova); Coachella, Riverside Co., off Western Black-tailed Deer (R. W. Burgess); Denny, Trinity Co., off Deer (E. E. Ladd); Carson Creek, Marin Co. (J. W. Maillard); Asilomar, Monterey Co. (L. S. Slevin); Sequoia National Park, 2,000 to 5,000 feet (E. C. Van Dyke); Mendocino Co. (E. R. Leach); Piedmont, Alameda Co. (E. R. Leach); 10 miles Northeast of Mariposa, Mariposa Co. (E. H. Nast); Cypress Ridge, Marin Co. (E. P. Van Duzee); Green River Camp, Lower Santa Ana Cn., Orange Co. (E. P. Van Duzee); Carmel, Monterey Co. (L. S. Slevin); Havilah, Kern Co. (E. S. Van Dyke); San Jacinto Mts., Riverside Co. (R. H. Beamer); Mt. Pinos, Sta. Barbara Co. (C. S. Robinson); Sulphur Springs, Lake Co. (L. S. Neville); Big Bear Lake, San Bernardino National Forest, Minnelusa, San Bernardino Co. (H. O. Robe); Craig Lake, 50 miles northwest of Los Angeles, Los Angeles Co. (L. S. Neville); San Bernardino, San Bernardino Co. (D. C. Spears); Mt. Hamilton, San Jose, Santa Clara Co., off Deer (L. R. Cody); Westwood, Lassen Co., off Western Black-tailed Deer; Tehama Co., supposedly off California Valley Quail (L. V. Compton); Ventura Park, Ventura Co. (W. L. Jellison); Monrovia Canyon, Los Angeles Co. (Chas. M. and Dorothy Martin); Bair's Ranch, Redwood Creek, Humboldt Co., off Western Black-tailed Deer (H. S. Barber); Humboldt Co., off *Odocoileus columbianus* (G. F. Ferris); San Gabriel Mts. near Pasadena, Los Angeles Co. (F. Grinnell, Jr.); Gualala, Mendocino Co., off *Odocoileus columbianus* (G. F. Ferris).—SOUTH DAKOTA: Custer State Park, Hermosa, Custer Co., 50 specimens off Wapiti, *Cervus canadensis* (R. E. Milliken).

All reliable records of *L. depressa* are from western North America: British Columbia, the State of Washington, Oregon, California, Montana and South Dakota. It will undoubtedly be found also in Idaho, Wyoming, Nevada, Utah, Colorado, Arizona

and New Mexico. Statements as to its occurrence in the eastern United States, I regard as erroneous. Say originally gave no locality for his specimens, but there is every reason to believe that he obtained them somewhere in the Rocky Mountains of Colorado, while a member of Stephen H. Long's Expedition of 1819-1820 (see the introductory remarks by Say, 1823, *Jl. Acad. Nat. Sci. Phila.*, III, p. 9). Wiedemann (1830), redescribing a cotype received from Say, merely assumed that it came from Pennsylvania, and this locality was copied by C. H. T. Townsend (1897), Speiser (1904), and Aldrich (1905). Falcoz (1930) reports *L. depressa* from Mexico, without more definite locality, and its occurrence in northwestern Mexico is quite likely.

The normal hosts are the Western Black-tailed Deer, *Odocoileus columbianus* (Richardson), the Western White-tailed Deer, *Odocoileus virginianus leucurus* (Douglas), the Mule Deer, *Odocoileus hemionus* (Rafinesque), and the Wapiti or American Elk, *Cervus canadensis* (Erxleben). Mr. H. S. Peters sent me seven winged males supposedly taken (but not by him) off California Valley Quail, *Lophortyx californica* (Shaw). While it is not impossible that these flies might have been living temporarily in the plumage of the birds, the record needs confirmation, for the reason given in my discussion of birds as temporary hosts of *L. cervi*.

Lipoptena mazamae Rondani

For synonymy, references and list of specimens examined, see J. Bequaert, 1931, *Psyche*, XXXVIII, p. 191.

ADDITIONAL SPECIMENS EXAMINED.—PANAMÁ: Ancón, Canal Zone (F. C. Bishopp and Green); Camp Pital, Chiriquí, off Brocket, *Mazama sartorii reperticia* Goldman (L. H. Dunn); Miraflores (A. H. Jennings); Chagres River Valley, off Panamá White-tailed Deer, *Odocoileus rotschildi* (Thomas) (L. H. Dunn); Alajuila, Canal Zone (H. C. Clark).—MEXICO: Camp Stella, Nayarit (recd. from R. Matheson); Orizaba (Sallé).—VENEZUELA: La Rubiera, one male and one female (F. M. Root; G. F. Ferris Collection).—TRINIDAD: Caparo (S. M. Klages); Guaiaco, off *Mazama rufa* (F. W. Urich).—SURINAM (Dutch Guiana): Paramaribo, two female cotypes of *surinamensis* (C. Heller; sent by A. Bau to G. F. Ferris); Moenyó, one male (C. Bonne).—BRAZIL: Hansa, Sa. Catharina, off *Mazama rufa* (Ehrhardt).—PARAGUAY: without more definite locality.—ECUADOR: San José, west of Huigra, 1,750 ft., in western Ecuador, off *Tayra barbara*.—BOLIVIA: Yacuiba, off *Mazama* (G. F. Ferris Collection).—TEXAS: Victoria, Victoria Co. (O. S. McMillin); Kerrville, Kerr Co. (H.

Lacy); San Antonio, Bexar Co. (Alex. Schleyer).—FLORIDA: 20 miles East of Naples, Collier Co., off White-tailed Deer (O. C. Van Hyning).—SOUTH CAROLINA: Charleston, off White-tailed Deer (H. S. Peters); Mount Holly, Orangeburg Co., off White-tailed Deer (D. Brainerd); Georgetown Co., off White-tailed Deer.—GEORGIA: Wassaw Id. near Savannah, Chatham Co., one specimen off cattle (U.S.N.M.).

L. mazamae is the only species of the genus known from Central and South America. There are reliable records from Mexico (as far north as Vera Cruz), Yucatán, Guatemala, Panamá, Venezuela, British Guiana, Dutch Guiana, Trinidad, Bolivia, Ecuador, Paraguay, Brazil, and northern Argentina (Chaco de Santiago del Estero). It is of considerable interest that this tropical species extends into the southeastern United States (Texas, Florida, Georgia and South Carolina). It probably occurs also in Louisiana, Mississippi and Alabama.

In an earlier paper (1931) I was unable to settle the question as to the normal hosts of this species. Material recently sent by Dr. L. H. Dunn, from Panamá, makes it quite certain that *L. mazamae* is a parasite of both true Deer (various species or races of *Odocoileus*) and Brocket (various species or races of *Mazama*). In the southeastern United States it occurs on White-tailed Deer, *Odocoileus virginianus virginianus* (Linnaeus). The accidental hosts include thus far domestic cattle and the grison (*Tayra barbara* Linnaeus).

I have attempted to show in 1931 that, from published descriptions, *L. depressa* var. *mexicana* C. H. T. Townsend (1897), *L. conifera* Speiser (1905), and *L. surinamensis* Bau (1930) could only be synonyms of *L. mazamae*. A recent study of two cotypes of *L. surinamensis* (the type locality of which is, according to the labels, "Paramaribo," not "Macaraibo") fails to disclose any difference from the widespread *L. mazamae*.